Other high-pressure facilities at the ALS:

Martin Kunz

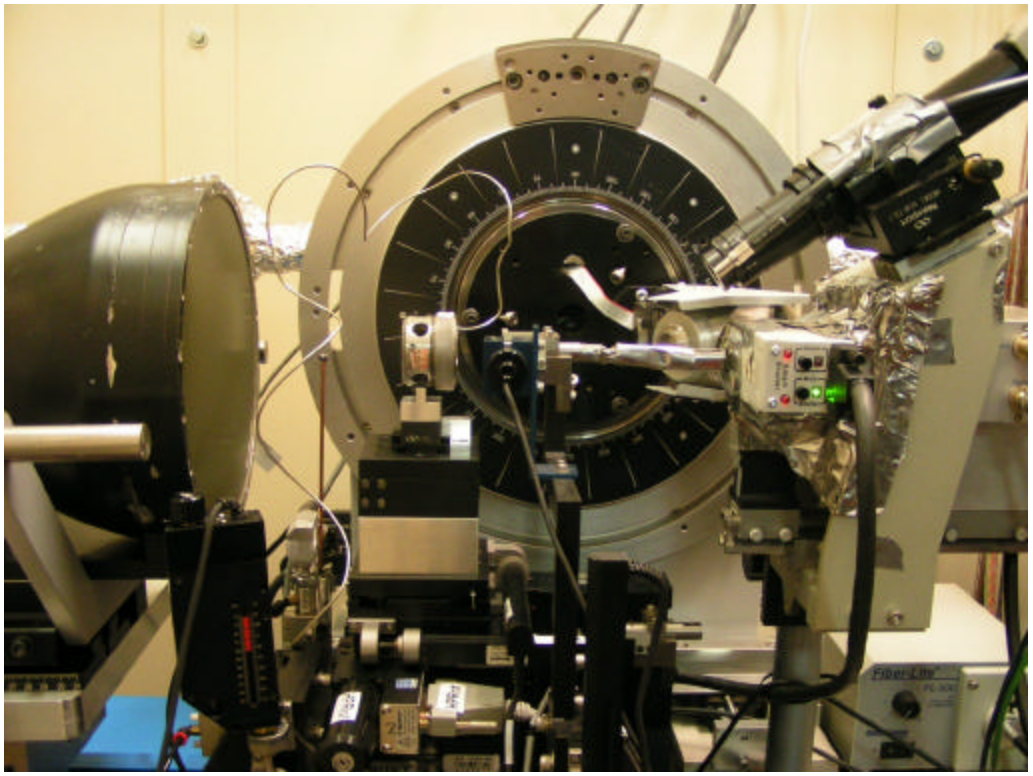
2006 Calipso Review

Outline:

- 11.3.1
- 4.3.1
- High-pressure lab.

2006 Calipso Review: 11.3.1

- ? range 0.6 to 2.0 Å
- Focus 200 x 90 µm, collimated down to 100 x 100 µm
- Detector: Bruker AXS Pt200 CCD
- Flux: 10^{10} photons/sec at sample location.



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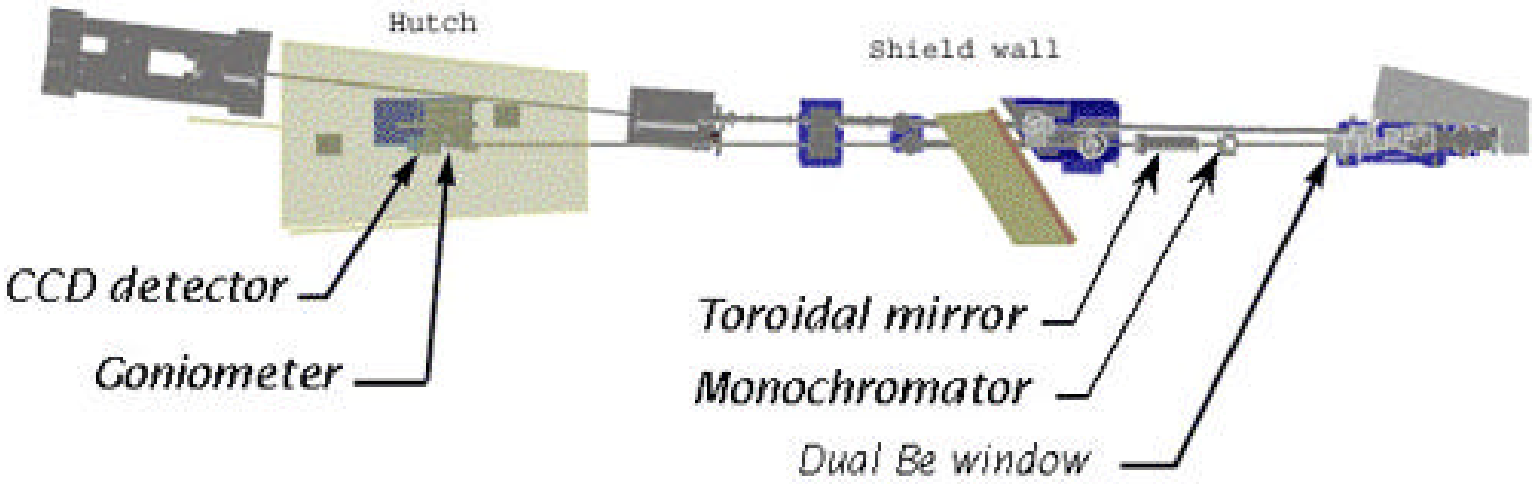
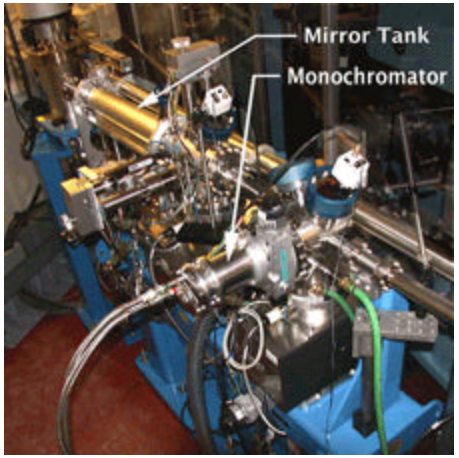
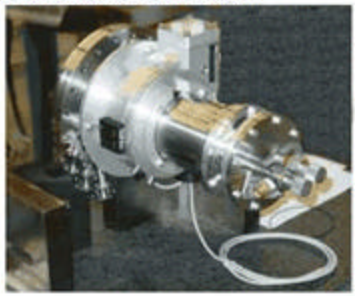




Si<111> Channel-Cut Monochromator

Internal View



External View

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PHYSICAL REVIEW B 74, 115405 (2006)

Compressibility of zinc sulfide nanoparticles

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(Received 17 March 2006; revised manuscript received 18 July 2006; published 12 September 2006)

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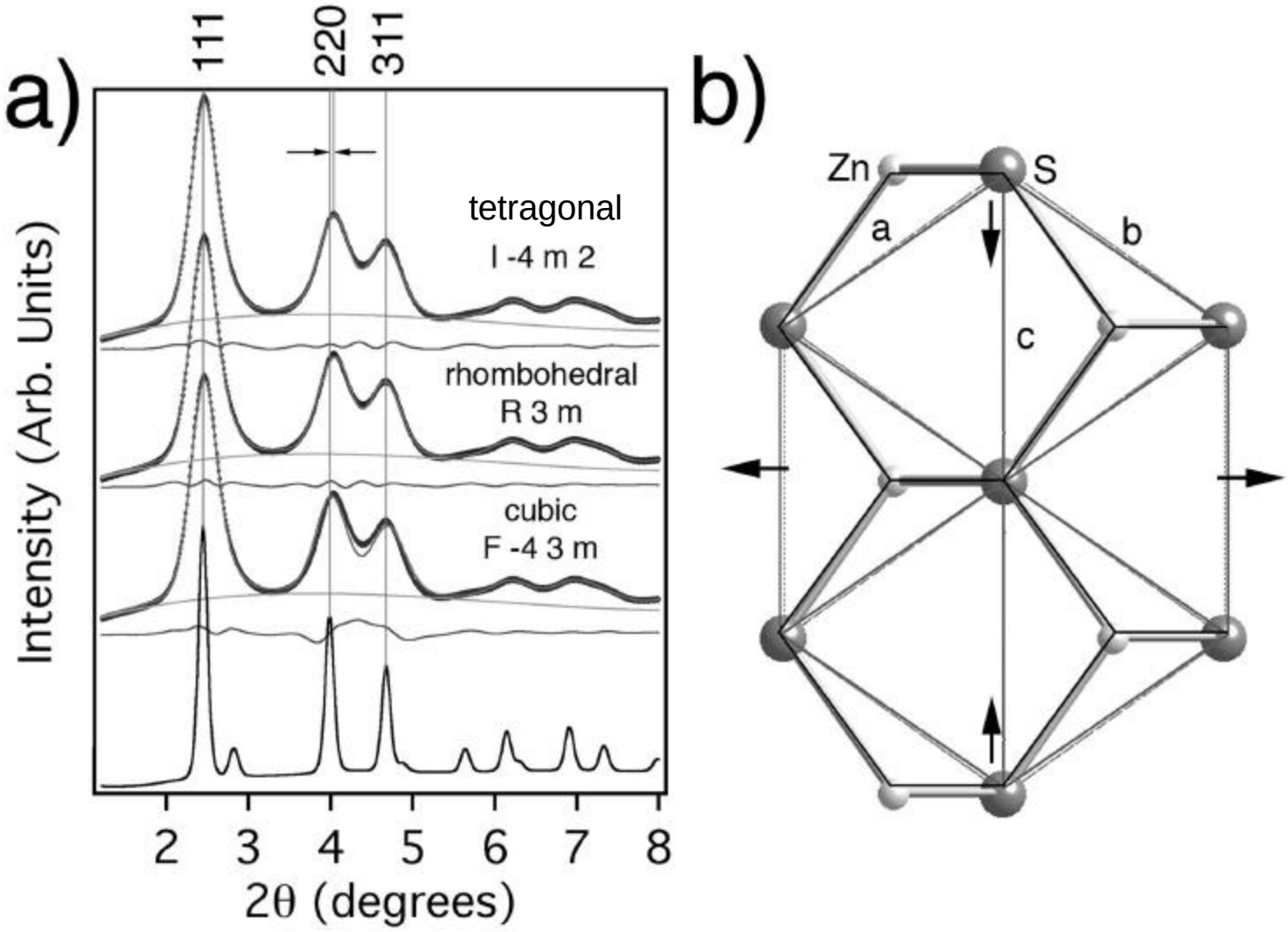

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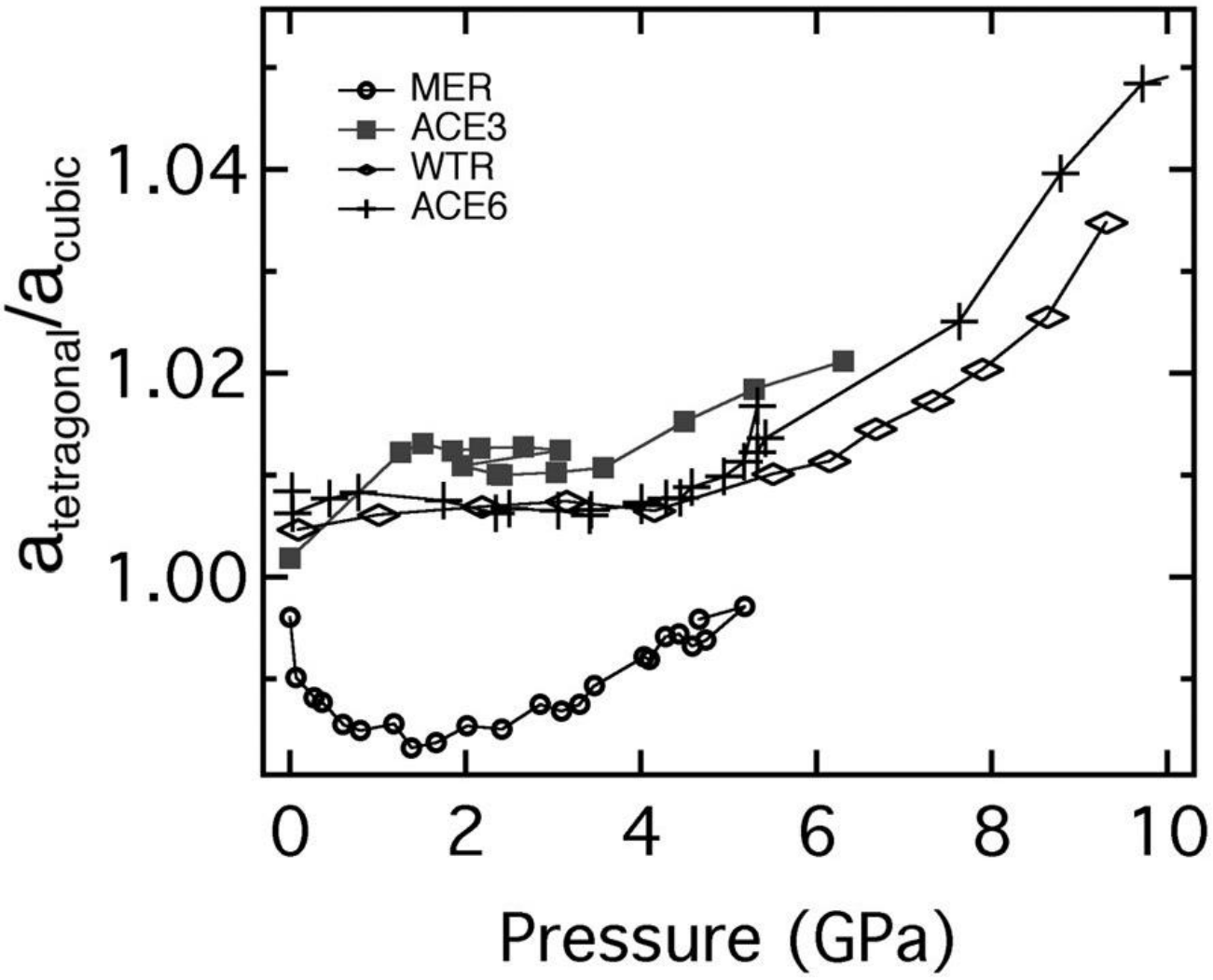
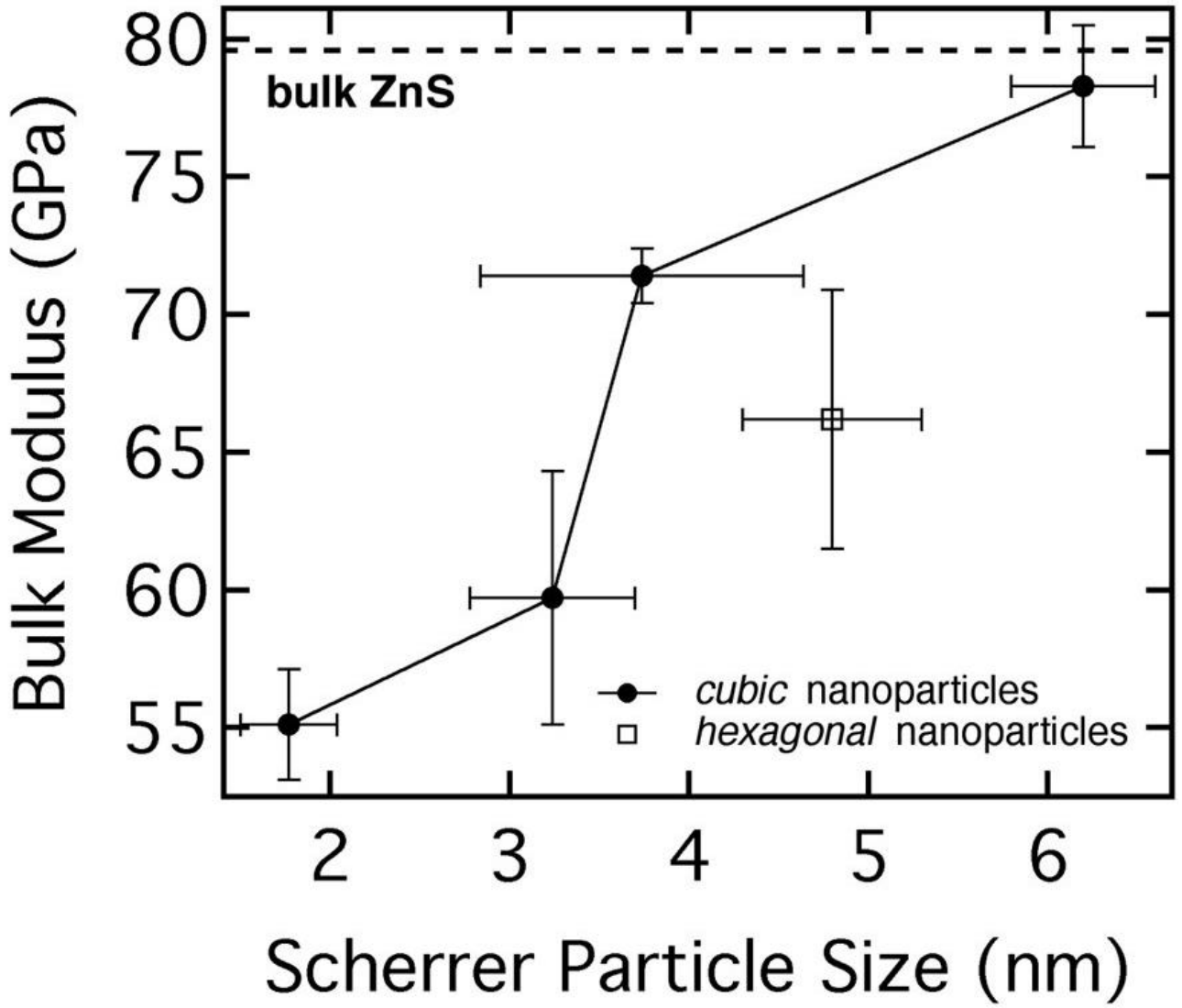


2006 Calipso Review: 11.3.1



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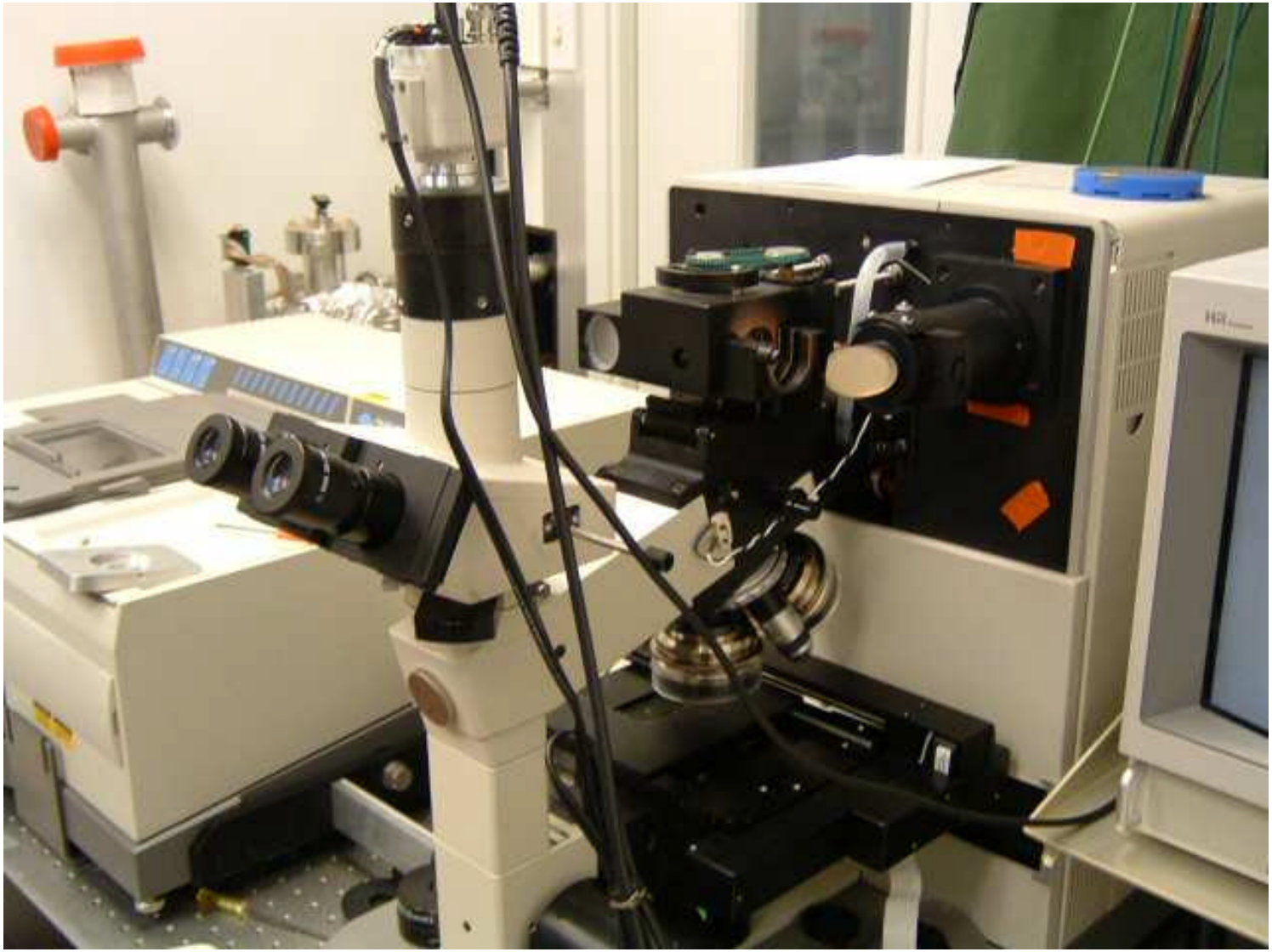

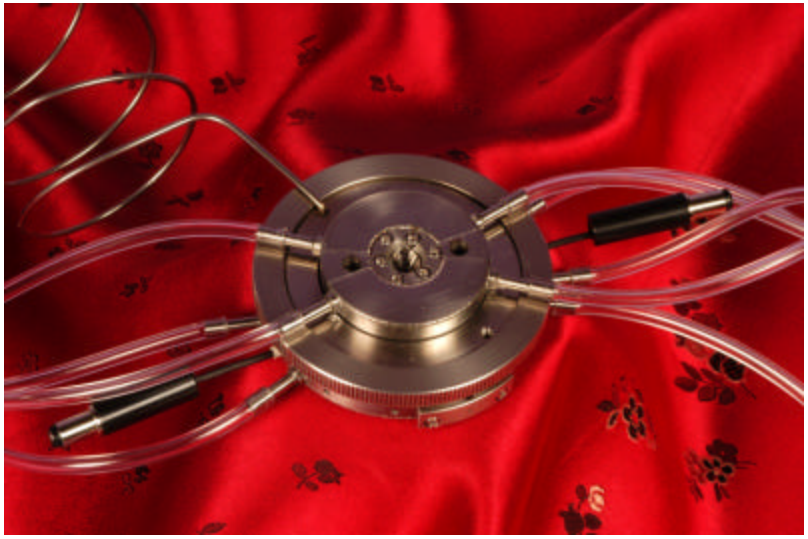

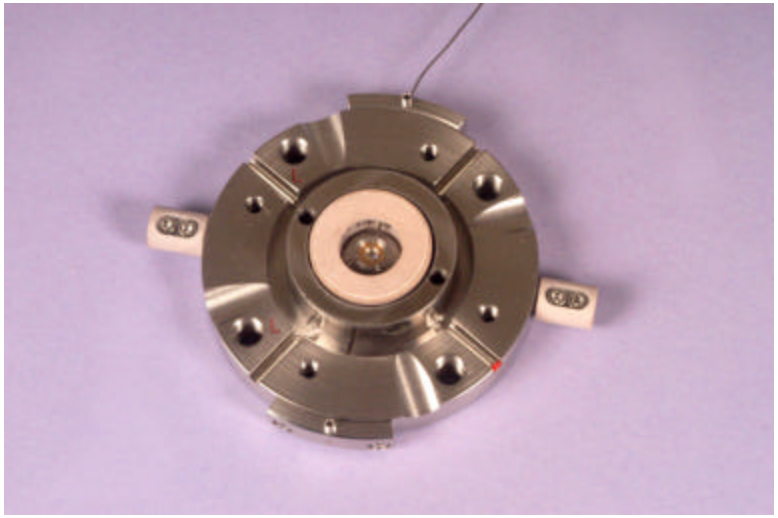

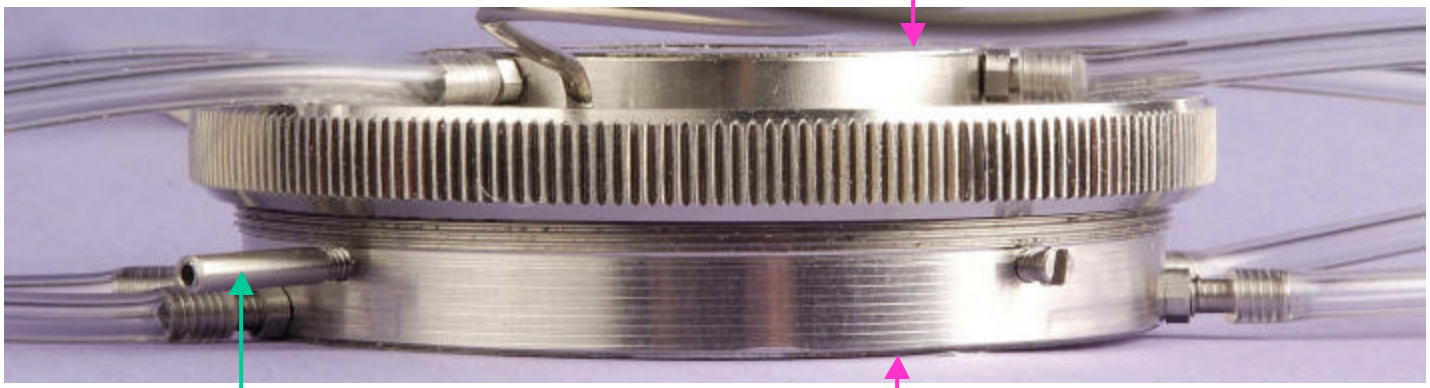

Gas flushing port

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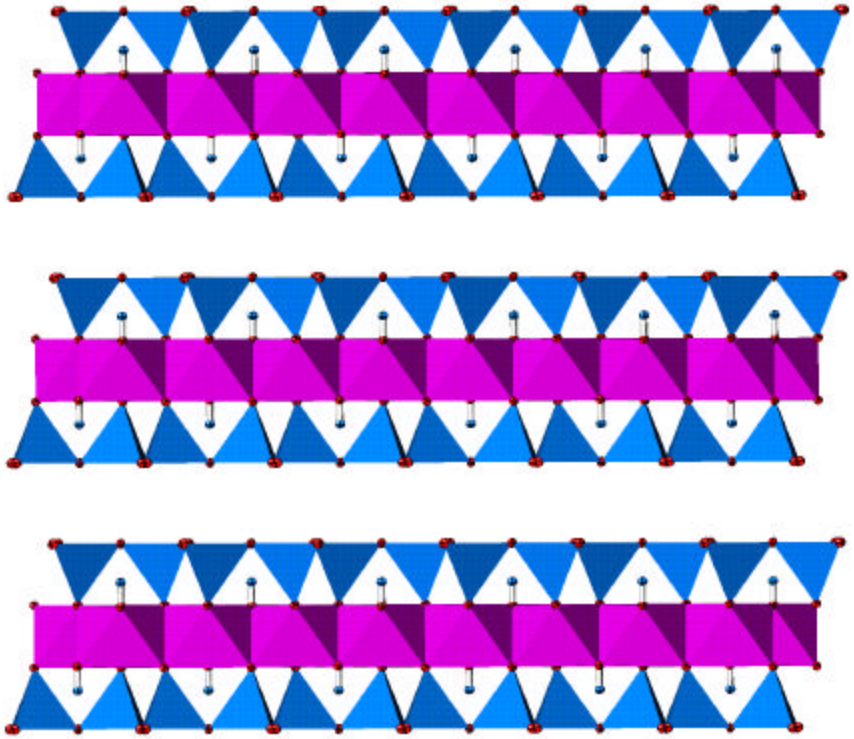
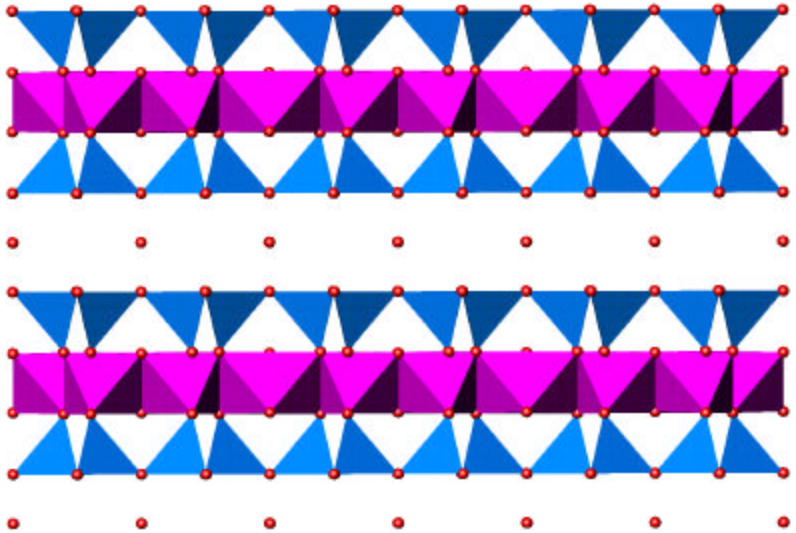


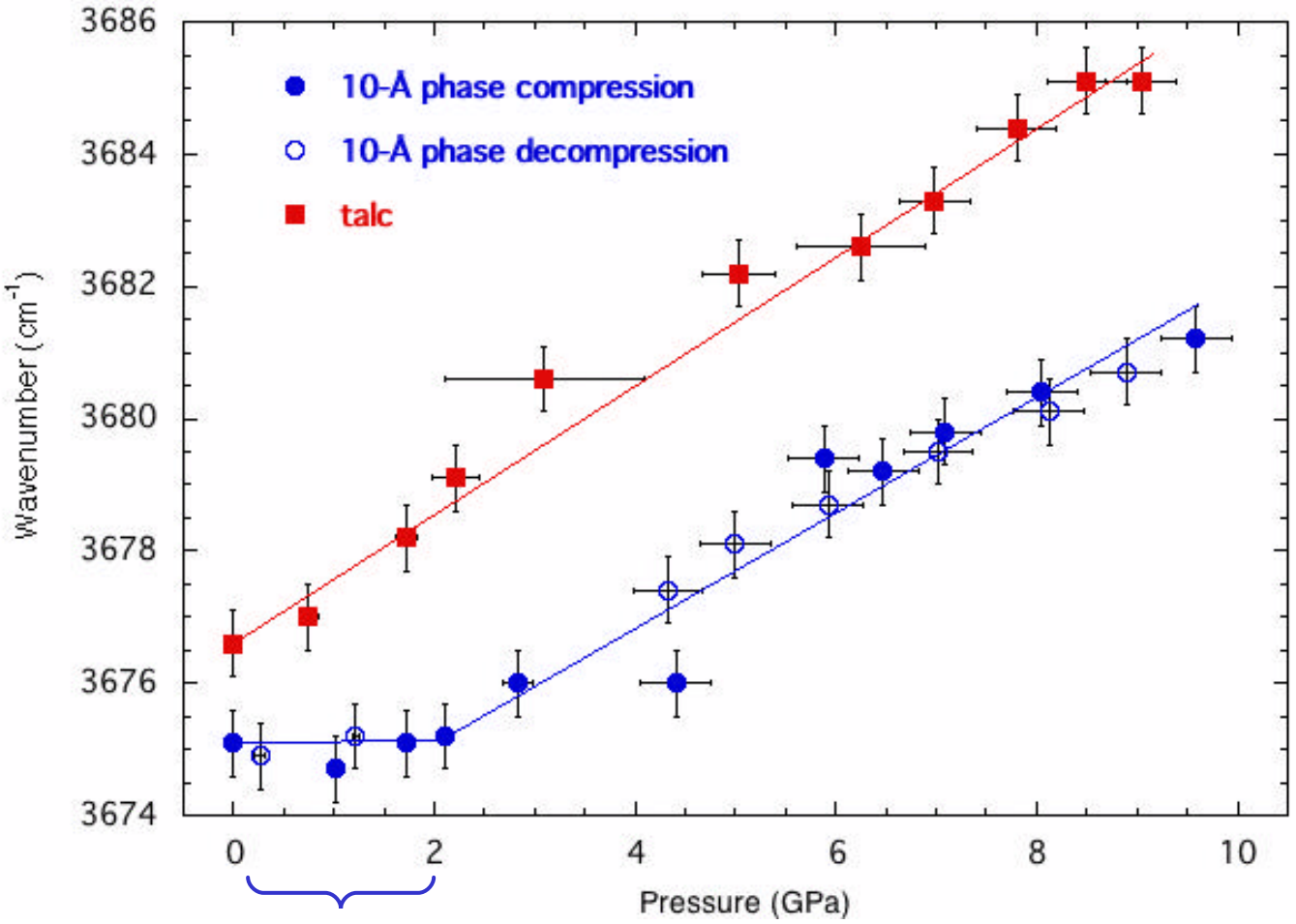
Talc



10Å phase

Pawley, Clark et al.

2006 Calipso Review: 4.3.1



10-Å phase:
0.9 $cm^{-1}GPa^{-1}$
(2 - 10 GPa)

0 - 2 GPa: no change

Summary Talc:

- Positive P-dependence = shortening and strengthening of O-H bond, due to compression of 2:1 layer.
- Positive P-dependence means no hydrogen-bonding, as compression would cause strengthening of hydrogen bonds and weakening of O-H bonds.
- Small frequency shift because most compression taken up by weakly bonded interlayer.

Summary 10 Å phase:

- No shift up to 2 GPa ⇒ no compression of 2:1 layer. All compression must be of interlayer.

- Above 2 GPa, P-dependence is similar to talc ⇒ similar compressional behaviour of 2:1 layer.

- No hydrogen bonding to interlayer H_2O.

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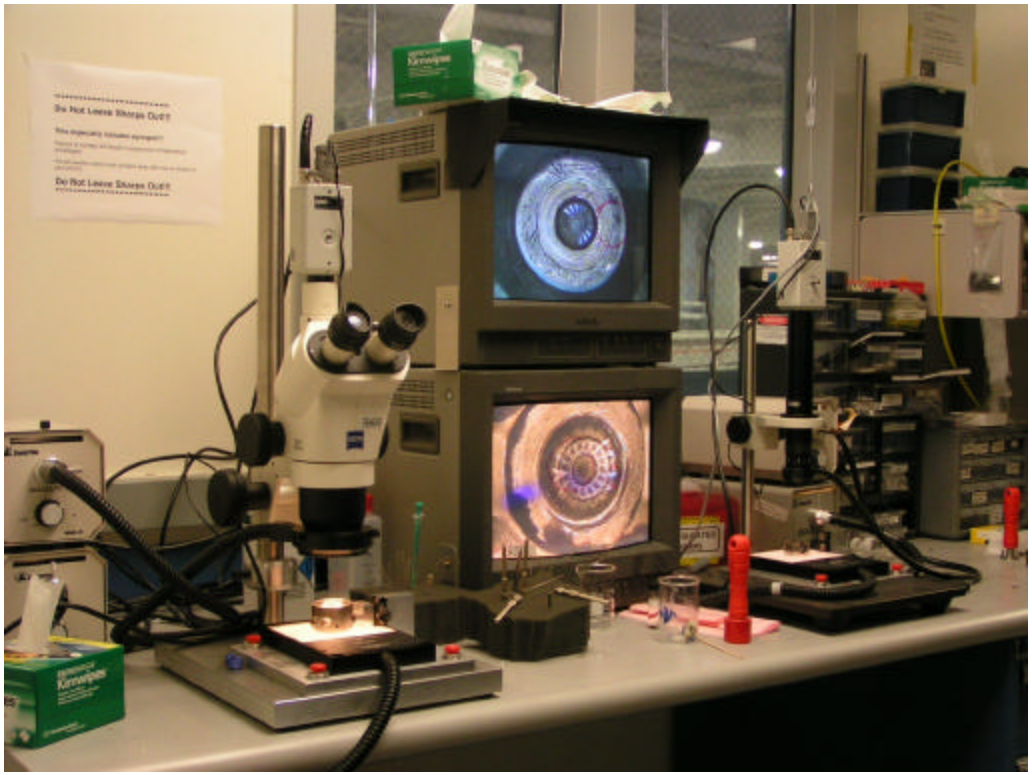
Sample preparation:



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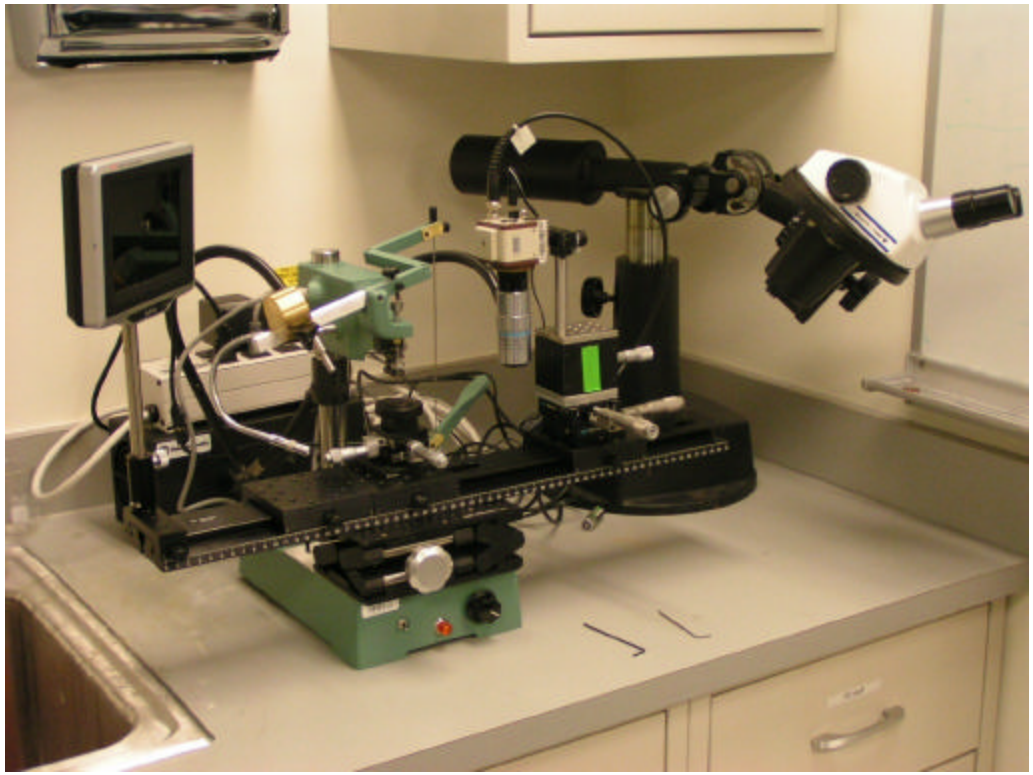
Mechanical driller:



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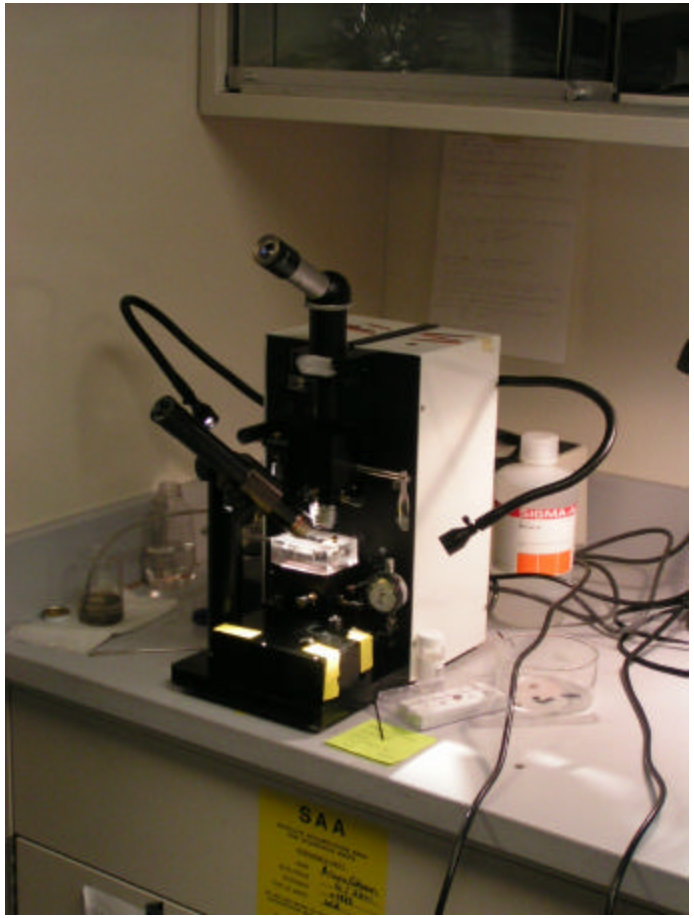
Electro erosion driller:



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Cryogenic loading (Ar,N_2):

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Brillouin spectroscopy: